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NATIONAL TRANSPORTATION SAFETY BOARD

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Air Carrier Operations Bulletin 1-94-17
Brace For Impact Positions

(3 Pages)

218. AIR CARRIER OPERATIONS BULLETIN NO. 1-94-17

BRACE FOR IMPACT POSITIONS

(Formerly Air Carrier Operations Bulletin No. 1-76-23 and includes NTSB SAFETY RECOMMENDATIONS A-79-76, A-79-77, and A-79-78).

- a. The Aeromedical Research Branch of the Civil Aeromedical Institute (CAMI), Protection and Survival Laboratory, has conducted research and tests with respect to establishing “brace for impact” positions for passengers and flight attendants.
- b. In order to establish a best brace for impact position for each person, it would be necessary to know the size and physical limitations of the individual, the seating configuration, the type of emergency, and many other factors.
- c. There are two primary reasons for bracing for impact. One is to reduce flailing and the other is to reduce secondary impact. Secondary impact can be reduced by prepositioning the body (particularly the head) against the surface it would strike during impact. Flailing can be reduced by having the occupant flex, bend, or lean forward over their legs in some manner.
- d. Aircraft being utilized today may have seating arrangements which result in very small seat pitches (the space between seats) or may have a combination of small and large seat pitch spacing (i.e., an aircraft with a first class/coach seating arrangement). Also recent amendments to Part 121 of the Federal Aviation Regulations (FAR) have upgraded the airworthiness standards for flight attendant seats including the requirement for shoulder harnesses. In view of this information, this bulletin is to provide the best possible information for most emergency situations.
- e. Passengers should take a brace position in one of several ways and in all cases, the seatbelt should be worn as tight as possible and as low on the torso as possible.
 - (1) In aircraft with low-density seating or seats spaced relatively far apart, passengers should, as depicted in Figures 2 or 3, rest their head and chests against their legs. Flailing can be reduced by having the passengers grasp their ankles or legs as depicted in Figure 2 or if they are unable to do that, they should wrap their arms under their legs as depicted in Figure 3. Their heads should be face down in their laps and not turned to one side.
 - (2) In aircraft with high-density seating or in cases where passengers are physically limited and are unable to place their heads in their laps, they should position their heads and arms against the seat (or bulkhead) in front of them as depicted in Figure 1.

- (3) Passengers in aft facing seats should rest their heads on the seat back (or bulkhead) behind them as depicted in Figure 5. The passengers should not place their hands in back of their heads, as has been recommended in the past, but rather, should either place their hands in their laps or grasp the side of their seats.
 - (4) The passengers' feet should be placed flat on the floor and slightly in front of the edge of the seat.
 - (5) Passengers should not use pillows or blankets between their bodies and the object they are bracing against (either a seat back or their own body). Pillows and blankets provide little, if any, energy absorption and increase the possibility of secondary impact injury. Also, pillows and blankets could create additional clutter in the aisles which could be a detriment in an emergency evacuation.
 - (6) Children which are occupying approved child restraint devices should be braced in accordance with the manufacturer's instructions. Children in passenger seats should utilize the same brace position as adults. Adults holding infants should provide as uniform support as possible to the infant's head, neck, and body, and lean over the infant to minimize the possibility of injury due to flailing.
 - (7) Pregnant or handicapped passengers may or may not need the assistance of another person in taking a brace position but should, in general, attempt to take the same brace position as the other passengers. If aft facing passenger seats are available, these passengers may benefit from being located to those seats.
- f. The brace positions for flight attendants will depend on the direction their seats face and type of restraint system those seats are equipped with.
- (1) In forward facing seats equipped with an inertial reel shoulder harness, the flight attendants should sit back in the seat as depicted in Figure 5 and rest their chin on their sternum as depicted in Figure 4. If the seats are equipped with noninertial reel-type shoulder harnesses, the flight attendants should fasten their shoulder harnesses as tight as possible, lean against them, and rest their chins on their sternums as depicted in Figure 4. The flight attendants' arms and hands should be positioned in their laps or holding onto the side of their seats, but should not be holding onto their restraint systems.
 - (2) In rear facing flight attendant seats, the flight attendants should sit back in their seats, rest their heads against their seat backs or headrests, and have the restraint systems, either inertial or noninertial type, as tight as possible as depicted in Figure 5. Their hands should not be clasped behind their heads, but may be positioned as in a forward facing seat.
- g. Helicopter "brace for impact" positions are the same as those for airplanes. Flight attendants, if present, should utilize either the brace position for passengers or for flight attendants depending on their seats and restraint systems.

- h. In the case of a planned emergency landing, the passengers should be briefed on the above information. In the case of an unplanned emergency, the flight attendants may only have enough time to give a short command such as “leanover” or “grab your ankles.” Experience has shown that in an attempt to take a brace position of some sort, the passengers will end up in a position which could result in less injury than if no attempt had been made at all.
- i. Principal operations inspectors (POI) are requested to evaluate the seat spacing and passenger briefing card brace positions of their assigned certificate holders and advise the certificate holders of the foregoing. Where appropriate, changes in the certificate holder’s crewmember emergency training program should contain bracing information appropriate to the aircraft and seat spacing being utilized by that certificate holder.

BRACING POSITIONS

(Figures 1 - 5)

øFIGURES NOT INCLUDED|